End-of-the-year Report

1988 - 1989

Evaluation of the Rare-Element Pegmatites

in the Northwest Territories

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PEGMATITE STUDIES IN THE ALYMER LAKE AREA, NORTHWEST TERRITORIES

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INTRODUCTION

A reconnaissance study was initiated during the summer of 1988 in the Aylmer Lake-MacKay Lake basin(s), in the central part of the Slave Province of the Canadian Shield (Fig. 1, 2). The initial effort was aimed at the Aylmer Lake region and two areas to the southwest, at Kirk and Reid Lakes (Fig. 3). An isolated occurrence at Muskox Lake was also inspected, and a virgin pegmatite population at Thonokied Lake was discovered.

The purpose of the study is to explore the prospects for economically significant rare-element pegmatites in the above basin(s). The presence of pegmatites with Be, Nb-Ta and/or Li mineralization was indicated in the forties and fifties, when a total of 11 pegmatites was recorded, scattered over this 28,000 km^2 territory (Folinsbee 1947, 1949, 1952; Lord and Barnes 1954). Such a spread of mineralized pegmatites, together with the geological setting and metamorphic relationships in the region indicates that more localities should be present, related to outcropping or hidden parental granites.

FIELD WORK

Inspection of the locations of previously recognized pegmatite occurrences, and of areas identified as potential targets on air photographs, has led to the discovery of additional 55 pegmatite dikes. Many of these also carry beryl, columbite-tantalite and/or spodumene. The potential of the basin(s) is still wide open, as the work carried out in summer 1988 covered only about 60% of the area.

The examined pegmatite localities were sampled for geochemical characterization. Plutonic intrusions of granites suspected to be parental to the

pegmatites were also sampled for whole-rock geochemical analysis. However, this work was so far only incidental to the pegmatite studies, as it was considered essential to test the calibre of the pegmatite-bearing area first.

In consequence, pegmatite localities will be inspected in 1989 over the western 40% of the basin(s), in the areas of Thonokied Lake, Lac de Gras and MacKay Lake. Systematic sampling of the granitic intrusions will be required in most of the plutonic bodies of the whole area of interest.

LABORATORY WORK

Chemical analysis of the collected whole-rock and mineral samples, and X-ray diffraction study of unidentified minerals are in progress. However, the data available at the time of writing this report are incomplete and cannot be meaningfully interpreted. Consequently, the geochemical evaluation of the pegmatite population and its parental granites will be feasible only at a later date, and will be included into the 1989-1990 reports.

AYLMER LAKE AREA

A total of 17 granitic pegmatites was examined at the junction of the western and northern arms of Aylmer Lake (Fig. 4). The pegmatites intrude metasedimentary schists, and they seem to form an envelope surrounding a pegmatitic leucogranite which outcrops as an island in the lake (Fig. 4). Their dimensions are variable from 3 x 5 m to 7 x 100 m, with one body in the extreme northeast reaching about 100 x 100 m. The pegmatites carry mainly beryl, in some cases also columbite-tantalite, and a number of dikes (largely not shown in Fig. 4) are barren. As shown in Fig. 4, there does not

seem to be any discernible regional zoning developed in this pegmatite series. This is understandable in terms of its narrow range of fractionation: the barren to beryl-columbite and beryl-columbite-phosphate subtypes do not allow for significant paragenetic differences (Table 1). However, it should be noted that the western cluster of pegmatites contains widespread alteration products of triphylite-lithiophilite, as opposed to a single locality of this mineral to the north-to-east from the central pluton. The western pegmatite cluster seems to be the most evolved (despite the pancity of columbite-tantalite), and it also is the most remote one from the potentially parent granite.

Another series of pegmatites was found in the southern part of Aylmer Lake (Fig. 4). Two pegmatites contain columbite-tantalite plus beryl, one has beryl only (Table 1). The largest intrusion measures 5 x 12 m in outcrop. This pegmatite population is too small to indicate any regional zoning. Two granite intrusions outcrop in close vicinity, to the south and to the east from the pegmatite location. The southern pluton is a good candidate for an intrusion parental to this pegmatite series, as it contains a sizeable unit of pegmatitic leucogranite. It also is much closer to the pegmatites than the granite to the east. More fractionated pegmatites may thus be located to the north of those examined so far.

NEBBISH LAKE AREA

A total of 10 mineralized pegmatites was identified in this area. The pegmatites are scattered over a sizeable area. Most of them are close to one or another of two small granitic plutons northwest and southeast of Nebbish Lake, but two dikes are relatively close to a large granitic intrusion

northeast of the lake (Fig. 4). The outcrop southeast of Nebbish Lake is an obvious candidate for a parent intrusion, because of its largely pegmatitic character. However, geochemical signatures of these 3 granites will be required to separate barren and fertile intrusions. However, if the granites are closely related among each other, the pegmatites may not be related to a specific outcropping body. The two small granite outcrops in the southwest may represent tops of domes that are connected below the present erosion surface with the main northeastern intrusion.

Four dikes contain beryl, columbite-tantalite was found with beryl in one pegmatite, and five dikes carry spodumene (Table 2). The four Li-bearing dikes to the south and east of the lake are particularly rich in spodumene. The outcrop dimensions of the pegmatites range from 5 x 12 m to 7 x 100 m.

The distribution of the pegmatit types is rather nondescript, with no apparent regional zoning pattern. This may also indicate a widespread batholithic granite subjacent to the metasediments hosting the pegmatites.

REID LAKE AREA

A total of 5 mineralized pegmatites was inspected in this area, besides numerous dikes that appear to be barren (Table 2). A single beryl-bearing pegmatite was found at the southern termination of the lake, relatively close to a granitic intrusion to the southeast (Fig. 5). Four beryl-bearing dikes, one of which also contains columbite-tantalite, are located at the northern end of the lake. The pegmatite outcrops range from 2 x 8 m to 5 x 12 m in size in this area.

Two Li-bearing pegmatites reported in the literature and marked in Fig. 5 could not be accessed in summer 1988.

The pegmatites seem to be centered around an apatite-bearing outcrop of pegmatitic leucogranite in the central parts of the lake. However, a two-mica pegmatitic granite also outcrops in close vicinity of the southern pegmatite cluster. The two pegmatite clusters are not necessarily cogenetic. The affiliation of the two spodumene-bearing pegmatites remains to be established.

KIRK LAKE AREA

A series of apparently barren pegmatites was examined in this area, concentrated around the northern end of the lake and surrounding a granite pluton situated there (Fig. 6). The pegmatite outcrops range from 3 x 6 m to 5 x 20 m in size. Only one of the pegmatites contains lazulite (Fig. 6, Table 2). If the pegmatites prove to be genetically related to the pluton central to their distribution, detailed examination of the outskirts of the known pegmatite population will be warranted. More fractionated and mineralized bodies may be located at a greater distance from the granitic parent. The granitic intrusion situated in the northern part of Kirk Lake is a good candidate for the pluton parental to the pegmatite population, as its western segment shows a gradation from a fine-grained biotite facies in the south to a pegmatitic leucogranite phase to the north, facing the pegmatites.

THONOKIED LAKE AREA

This area shown on Fig. 1 was visited only briefly at the end of the field season. No pegmatites were reported from this area previously, but their presence was suspected from the distribution of fine-grained and

pegmatitic two-mica granite intrusions in the area. A sizeable pegmatite population was discovered to the northeast of the lake, with distinct indication of regional paragenetic zoning. Detailed examination of this area will be performed at the beginning of the 1989 field season.

MUSKOX LAKE

A single pegmatite is located at Muskox Lake (Fig. 3), reported previously to contain columbite-tantalite. The outcrop of this dike is 5 x 10 m in size, in part aplitic, in part coarse pegmatitic with conspicuous quartz pods. It contains a black opaque mineral resembling columbite-tantalite but otherwise no other rare-element minerals. Aerial inspection of the vicinity did not reveal any other pegmatite outcrops.

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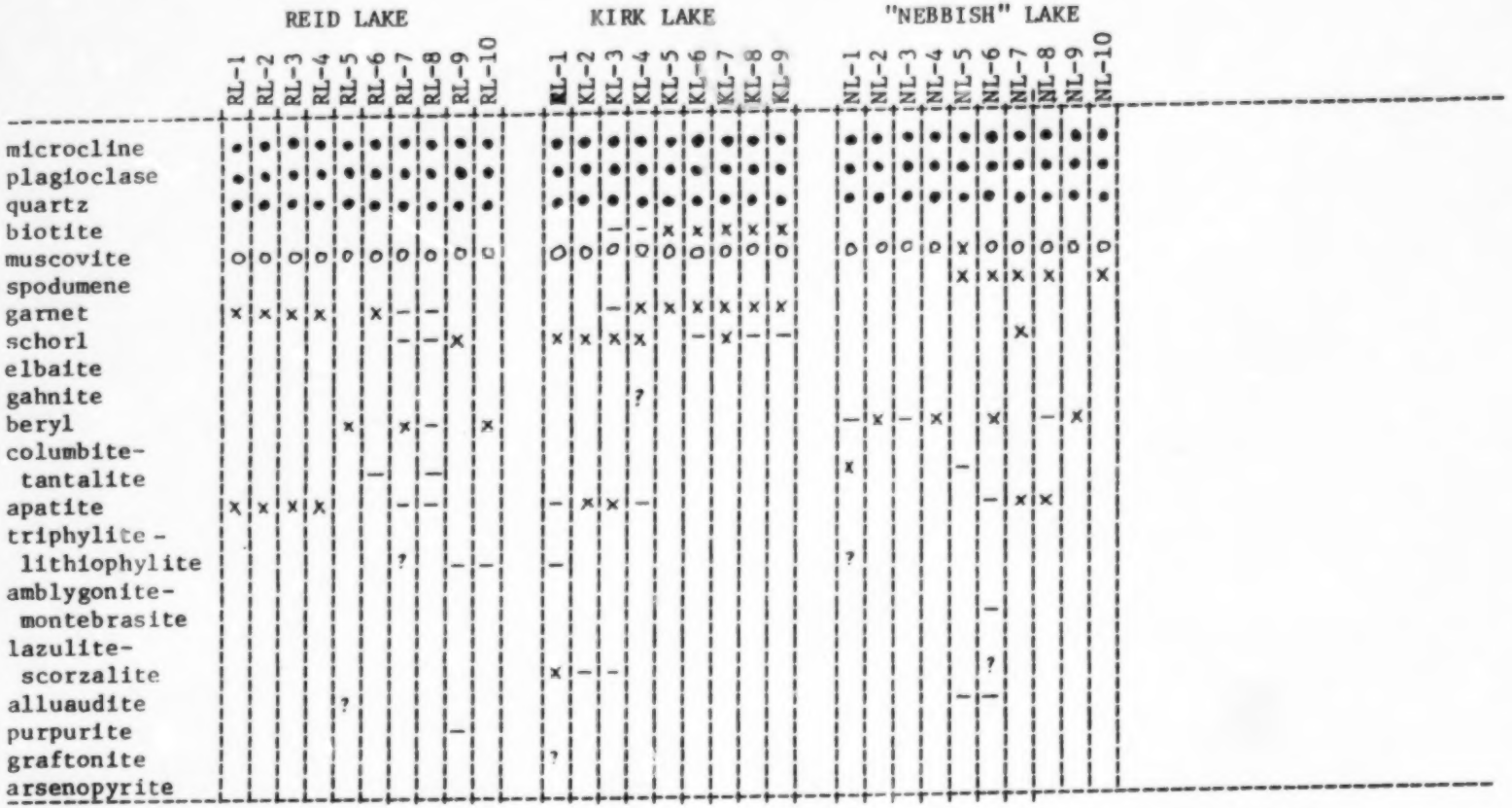
AYLMER LAKE

	AL-1	AL-2	AL-3	AL-4	AL-5	AL-6	AL-7	AL-8	AL-9	AL-10	AL-11	AL-12	AL-13	AL-14	AL-15	AL-16	AL-17	AL-18	AL-19	AL-20
microcline	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
plagioclase	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
quartz	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
biotite																				
muscovite	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
spodumene						(–)	(–)													
garnet																		x	–	x
schorl		–	–							x		x	–	–	–	x				
elbaite										?										
gahnite																				
beryl	–				x	x	x	–	–		x		–	–	–	x	x		–	x
columbite-tantalite		–	–			–				?					–	–	–	–		
apatite	?	x	x			–	–		–	–					–	x		–	–	x
triphylite-lithiophylite					?	?	?	?		?								?		
amblygonite-montebrasite																			?	
lazulite-scorzalite																				
alluaudite											–									
purpurite																				
graftonite																				
arsenopyrite						–														

●=abundant, ○=subordinate, x=accessory, –=rare, ()=early/totally altered, ?=questionable

Table 1. Mineral assemblages in the pegmatites of the Aylmer Lake area.



●=abundant, O=subordinate, x=accessory, –=rare, ()=early/totally altered, ?=questionable

Table 2. Mineral assemblages in the pegmatites of the Reid Lake, Kirk Lake and Nebbish Lake areas.

Fig. 1. Location of the Aylmer Lake-MacKay Lake area within Northwest Territories.

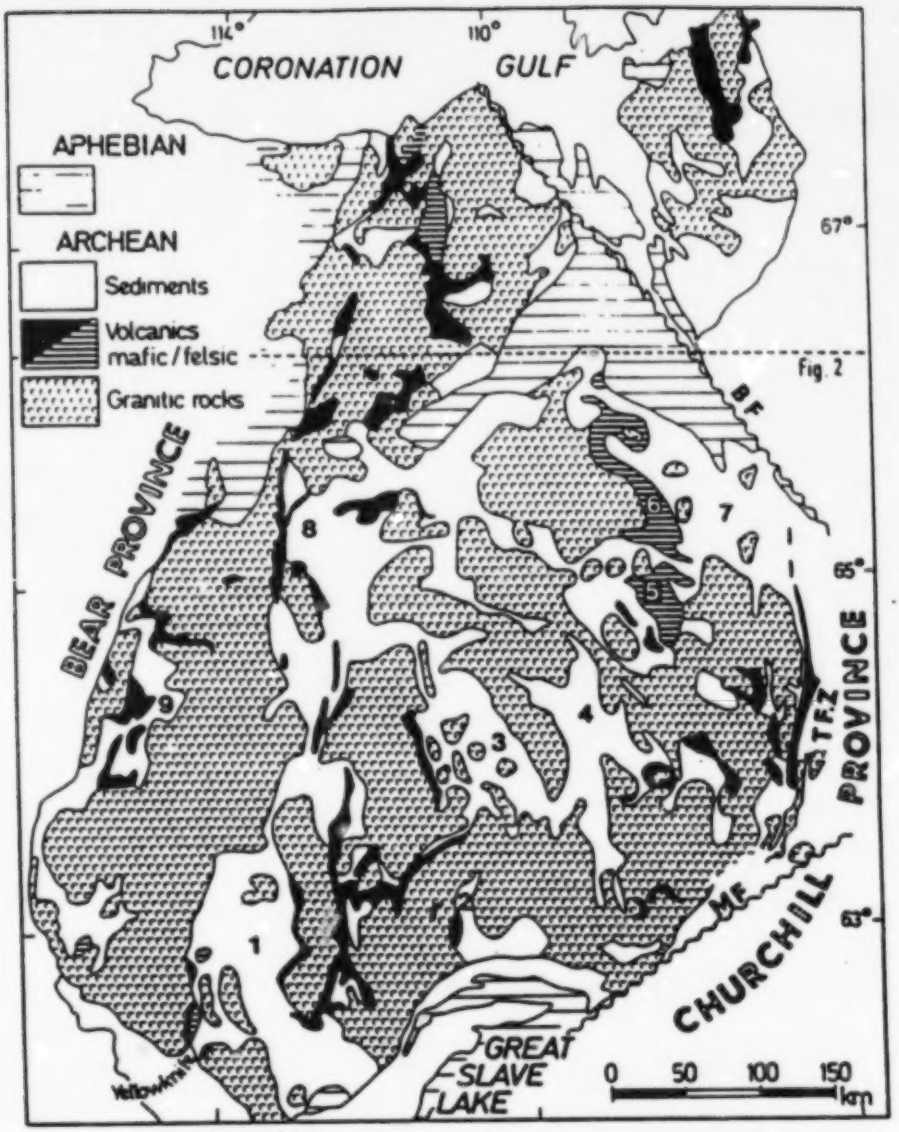


Fig. 2. Location of the Aylmer Lake (4) - MacKay Lake (3) area within the Slave Province.

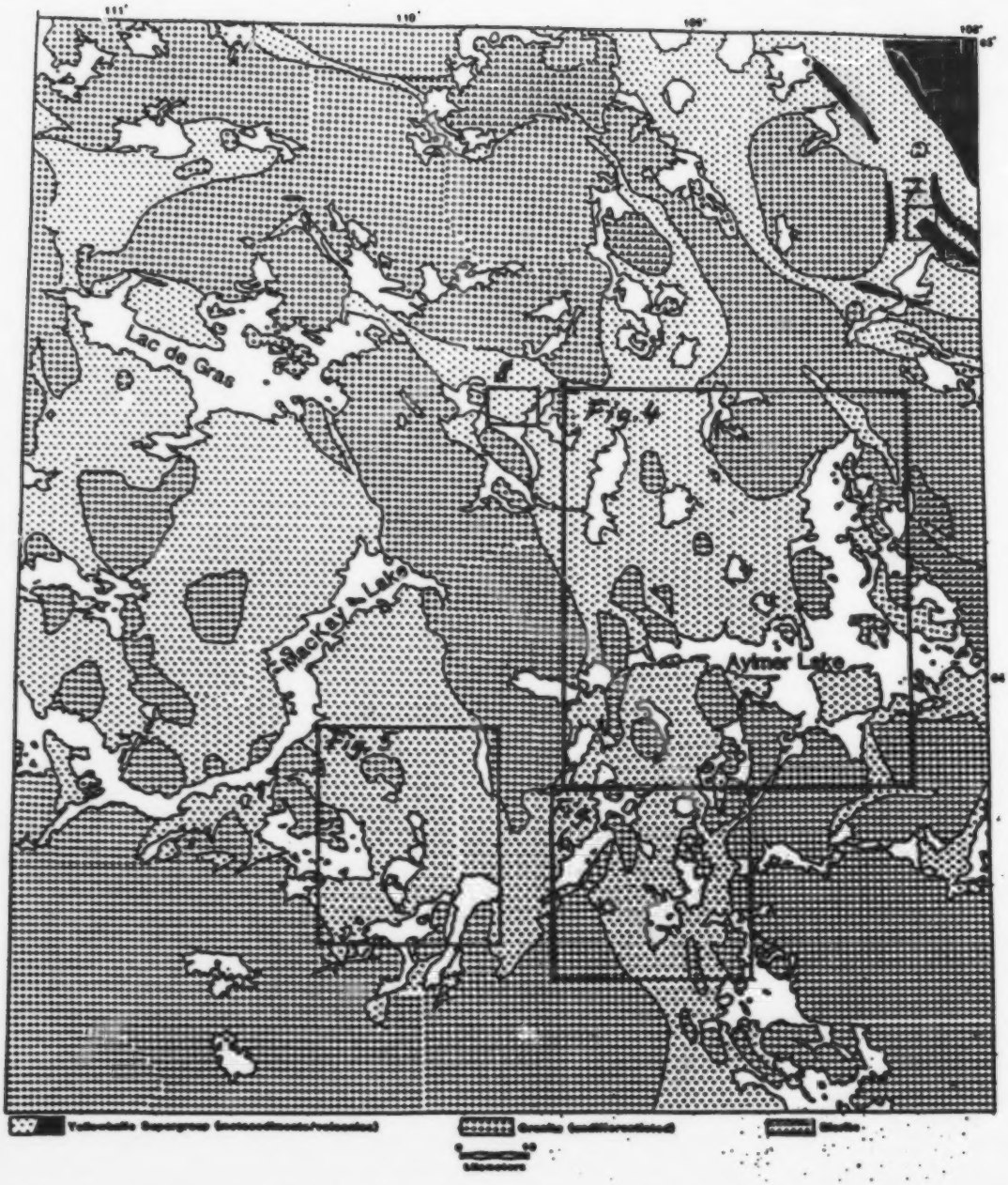


Fig. 3. Index map of the Aylmer Lake-MacKay Lake basin(s), showing the disposition of location maps of Aylmer Lake-Nebbish Lake (Fig.4), Reid Lake (Fig. 5), Kirk Lake (Fig. 6), Muskox Lake (#7 above) and Thonokied Lake (#8 above) pegmatite populations.

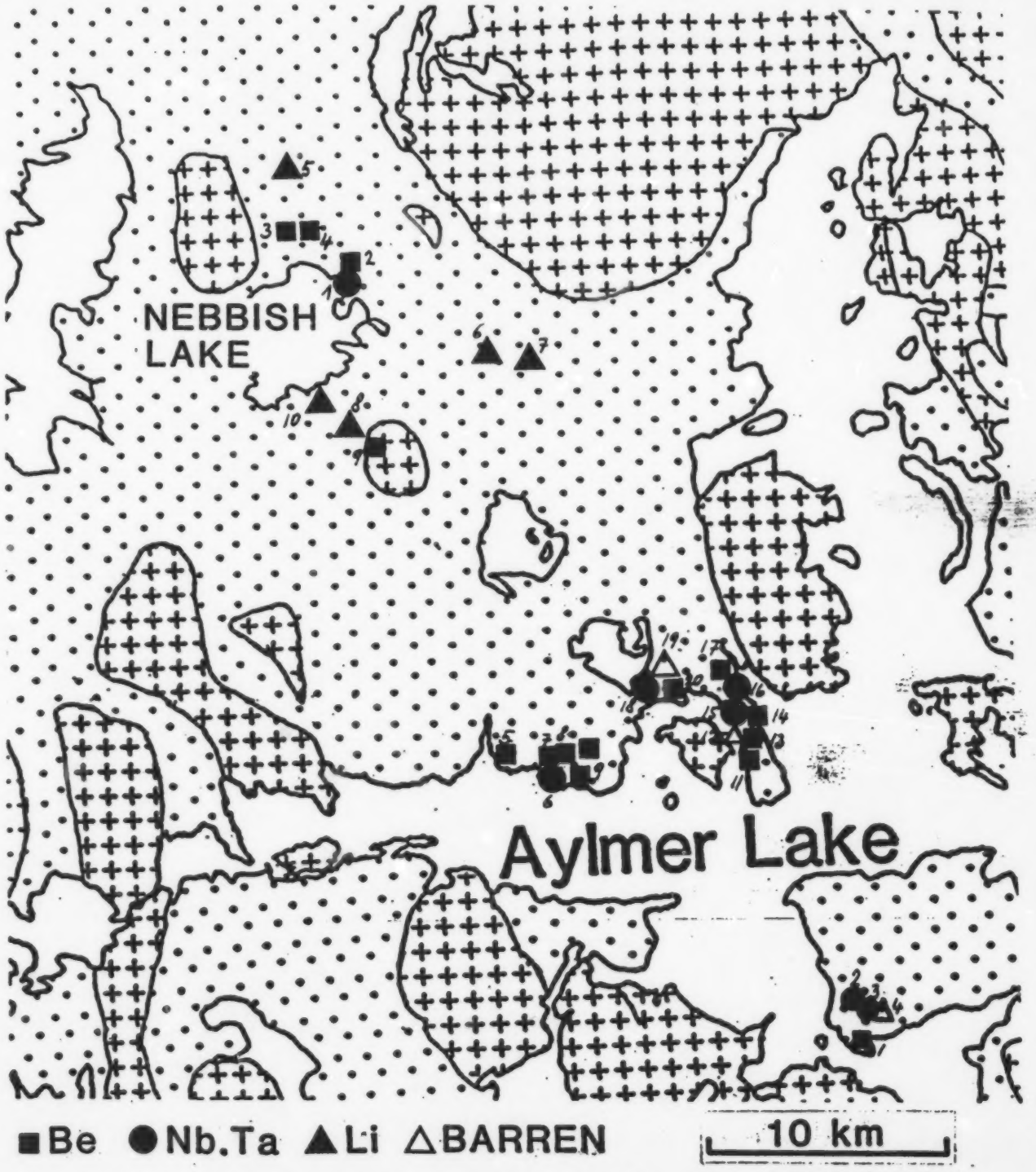


Fig. 4. Location map of pegmatite occurrences at Aylmer Lake and Nebbish Lake. Pegmatite identification numbers in the Nebbish Lake area have the prefix NL- (Table 2); all the other numbers are prefixed by AL- (cf. Table 1).

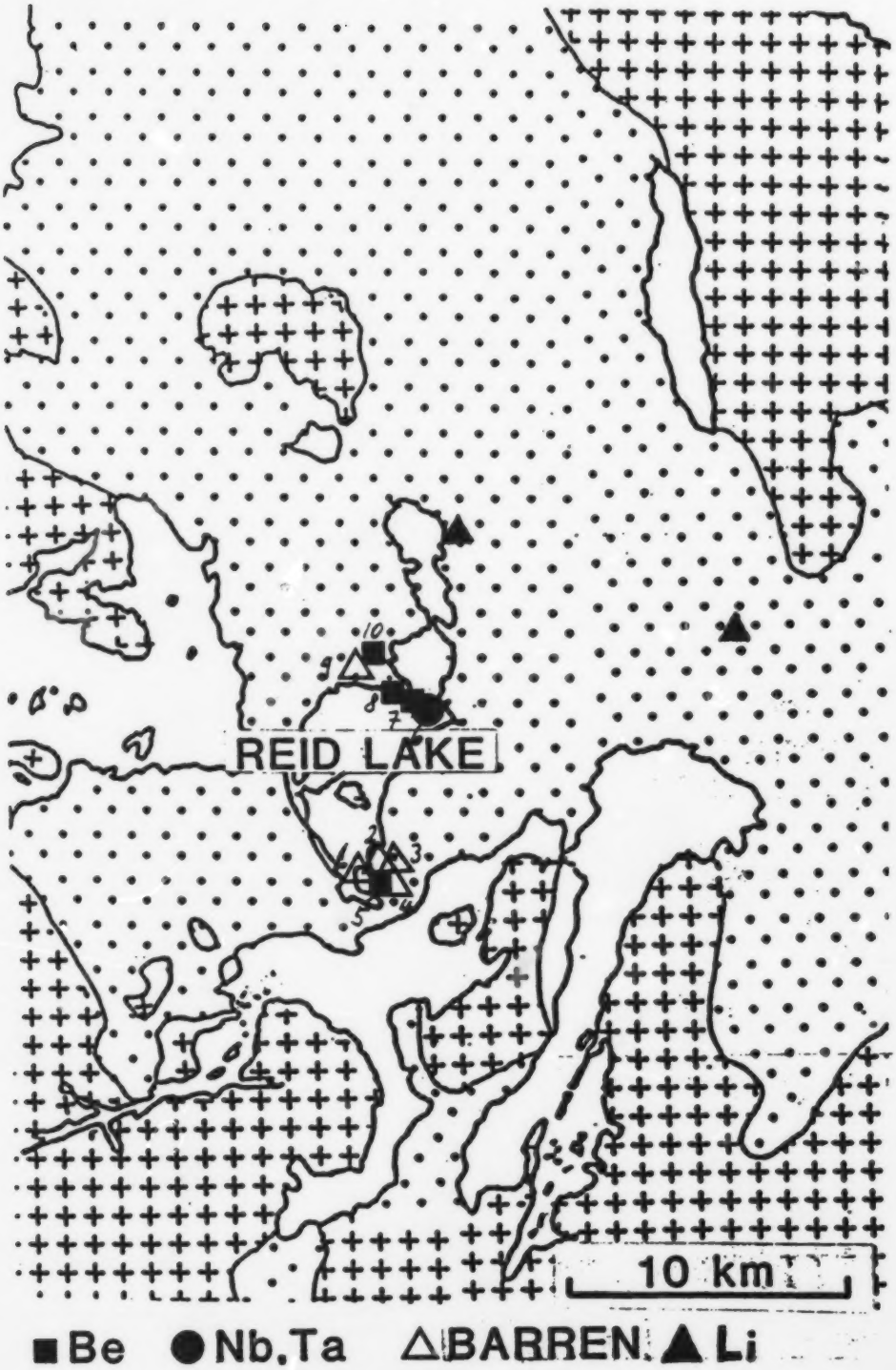


Fig. 5. Location map of the pegmatite occurrences at Reid Lake. All pegmatite identification numbers correspond to those with prefix RL- (cf. Table 2).

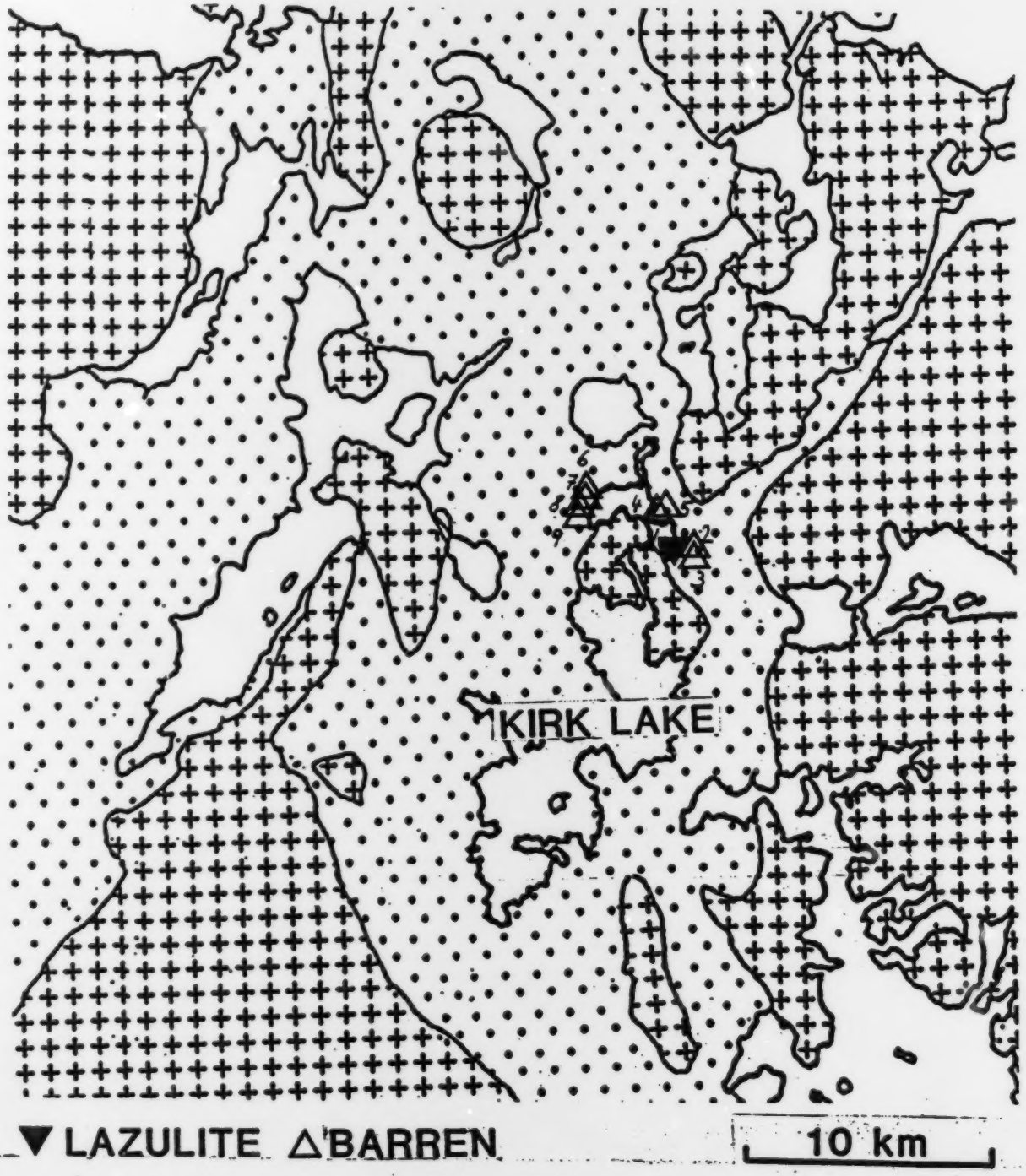


Fig. 6. Location map of the pegmatite occurrences at Kirk Lake. All pegmatite identification numbers correspond to those with prefix KL- (cf. Table 2).